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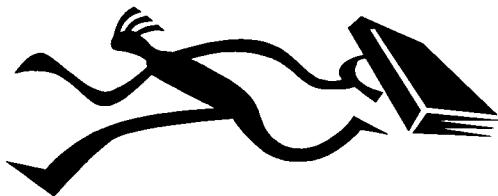
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## ABSTRACT

This report provides results of the survey and other sources of information which have been used to develop a transportation management plan at Cabrillo College (California). In 2000, Cabrillo College organized a Transportation Management Committee to review the existing transportation situation and develop and implement a plan with the goal of reducing single occupant automobile trips to and from the College. One step in reviewing the current state consisted of surveying the College students, staff, and faculty to assess their transportation behaviors and incentives and disincentives to alternative transportation. This study indicates that: (1) most trips by Cabrillo students, staff, and faculty are solo automobile commutes--close to 75% of employees drive alone to work; (2) carpooling and bussing are the two most frequently used alternatives to cars; (3) buses seemed to receive the most interest as an alternative to solo driving; (4) primary bus motivators were automatically receiving bus passes and making bus trips quicker, such as through express buses or more direct routings to reduce bus changes; (5) increasing the number of bike lanes may encourage more bicycle riding; and (6) protecting the environment, reducing traffic congestion, and saving money were the reasons cited to consider alternative transit. (JA)

# Cabrillo College

## Cabrillo College Transportation Study



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# Cabrillo College Transportation Study

## Summary

- Most trips by Cabrillo students, staff, and faculty are solo automobile commutes
- Carpooling and bussing are the two most frequently used alternatives
- Buses seemed to receive the most interest as an alternative to solo driving
- Primary bus motivators were automatically receiving bus passes and making bus trips quicker, such as through express buses or more direct routings to reduce bus changes
- Increasing the number of bike lanes may encourage more bicycle riding
- Protecting the environment, reducing traffic congestion, and saving money were the reasons cited to consider alternative transit
- Distance traveled does not appear to influence the frequency of solo commuting.

## Introduction

In 2000, Cabrillo College organized a Transportation Management Committee to review the existing transportation situation and develop and implement a plan with the goal of reducing single occupant automobile trips to and from the College. The committee consisted of representatives from Cabrillo College, UC Santa Cruz, the Santa Cruz Metropolitan Transit District, the Santa Cruz County Transportation Commission, and the Transit Management Agency. One step in reviewing the current state consisted of surveying the College students, staff, and faculty to assess their transportation behaviors and incentives and disincentives to alternative transportation. Cabrillo's Planning and Research Office (PRO) directed the design, implementation, and analysis of the survey. Results of the survey combined with other sources of information have been used to develop a transportation management plan and provide baselines with which to evaluate trip reduction strategies.

## Methods

### Survey Development

The Transportation Management Committee developed a series of survey questions designed to meet planning needs. Surveys from other agencies provided ideas for generating questions and anticipating results (National Personal Transportation Survey 1995, City of Boulder 2000, University of California at Santa Cruz 2000).

### **Faculty and Staff**

Researchers attempted to provide all faculty and staff with an opportunity to respond to the survey. Surveys were distributed via the campus mail system and a series of email announcements from the College President, Vice-President of Student Services, and staff Union President informed faculty and staff of the study. A total of 229 faculty and staff members returned their completed surveys by mid-December, 2000. A roughly equal number of faculty and staff completed the surveys. Most of the faculty (67.5%) and staff (75.2%) who completed the surveys were full-time. Of all the survey respondents, 75.5% were women. Eight out of 10 of the respondents were white (84.6%).

### **Students**

Out of 1939 enrollments representing 1790 individuals in 57 randomly selected sections, a total of 1291 students responded to in-class surveys between the 5<sup>th</sup> and the 10<sup>th</sup> of March 2001. Research assistants administered the survey in the randomly selected sections during class. The main campus students returned 1090 surveys while Watsonville Center students returned 131 surveys and the San Lorenzo Valley (SLV) site returned 70 surveys. Some of the students were also faculty (12% of respondents) or staff (13% of respondents).

### **Survey Representativeness**

To evaluate how well the transportation survey respondents may represent all Cabrillo College faculty, staff, and students, we compared the gender, ethnicity, and age of respondents to the Cabrillo faculty, staff, and student population. If respondent characteristics mirror closely the overall population, it would strengthen the argument that survey respondents are representative of the population.

Data were obtained from the Cabrillo College Data Warehouse. Student data are from the current census while most of the employee data is from the 1998-1999 academic year with the exception of faculty ethnicity, which is from Fall 2000, and staff age, which is from the 1994-1995 academic year. Gender and ethnicity of employee respondents were compared to the population using Chi-square and ages of employee respondents were tested with a Z-test. Test statistics were not calculated for students as the margin of error in demographics due to non-responses overlaps with population data.

The case for a representative sample is stronger with staff than with faculty based upon just the demographic data. These differences between respondent and population demographics are especially of concern if there is some relation between responses and demographic variables. A Kohonen neural network was trained to see if responses could be effectively clustered by gender, ethnicity, or age. None of these demographics appeared to separate respondents into distinct groups. A confirmatory logistic regression showed that neither gender, ethnicity, or age could significantly predict the outcomes of several key responses. These findings indicate that the shortfall in demographic similarity of respondents to the population at least did not appear to relate strongly to survey responses, increasing the confidence in the generalizability of the results.

For student respondents, gender and ethnicity proportions appear similar to Cabrillo wide proportions by location within error due to unknowns. The average age of respondents appears lower than Cabrillo wide average ages by location. This may be due to section random selection being weighted by class size. Younger students were significantly more likely to be in larger classes ( $p < 0.0005$ ), which could have resulted in the younger sample. In addition, younger students may be more likely to enroll in multiple sections and commute with more frequency to Cabrillo making a younger sample both more likely and more appropriate.

**Table 1. Gender comparison of Transportation Survey respondents and all Cabrillo employees.**

	Faculty		Staff	
	respondents	Cabrillo wide	respondents	Cabrillo wide
Female	83%	54%	68%	61%
Male	17%	46%	32%	39%
Total	109	188	107	444
Chi-square	36.48		2.47	
p	0.000		0.12	

Note: excludes unknowns

**Table 2. Ethnic comparison of Transportation Survey respondents and all Cabrillo employees.**

	Faculty		Staff	
	respondents	Cabrillo wide	respondents	Cabrillo wide
Hispanic	7%	9%	7%	15%
White	82%	87%	88%	77%
Other	12%	4%	6%	8%
Total	104	186	106	444
Chi-square	13.43		7.16	
p	0.001		0.03	

Note: excludes unknowns

**Table 3. Age comparison of Transportation Survey respondents and all Cabrillo employees.**

		Mean	sd	Median	Count	z	p
Faculty	respondents	48	8	50	77	-2.45	0.007
	Cabrillo wide	50	9	52	193		
Staff	respondents	48	9	49	112	-1.34	0.090
	Cabrillo wide	49	10	49	221		

Note: Z calculated with finite population correction factor

**Table 4. Gender comparisons of sampled sections to actual respondents to all Cabrillo students.**

	sampled sections			respondents			Cabrillo wide		
	Main	SLV	WATS	Main	SLV	WATS	Main	SLV	WATS
Female	52%	57%	70%	52%	43%	56%	56%	57%	68%
Male	46%	43%	28%	40%	49%	34%	43%	42%	30%
Unknown	1%	0%	2%	8%	9%	10%	1%	1%	2%
Total	1688	70	181	1090	70	131	11376	223	900

**Table 5. Ethnicity comparisons of sampled sections to actual respondents to all Cabrillo students.**

	sampled sections			respondents			Cabrillo wide		
	Main	SLV	WATS	Main	SLV	WATS	Main	SLV	WATS
Hispanic	17%	7%	91%	13%	3%	81%	18%	8%	82%
Other	12%	4%	3%	15%	13%	5%	9%	8%	4%
Unknown	2%	3%	1%	13%	13%	9%	3%	2%	1%
White	69%	86%	6%	59%	71%	5%	70%	83%	14%
Total	1688	70	181	1090	70	131	11376	223	900

**Table 6. Age comparisons of sampled sections to actual respondents to all Cabrillo students.**

		Mean	sd	Median	Count
sampled sections	Main	25.9	9.8	21.9	1688
	SLV	29.4	11.9	23.4	70
	WATS	29.9	10.6	27.0	181
respondents	Main	25.7	9.9	22.0	891
	SLV	32.6	13.0	26.0	46
	WATS	28.9	10.7	26.0	103
Cabrillo wide	Main	30.2	12.4	25.0	11376
	SLV	30.4	12.6	24.0	223
	WATS	29.3	10.5	25.0	900

## **Results**

### **Faculty and Staff**

About a quarter (24.5%) of the faculty/staff live within 3 miles. Another 20.1% live between 4 to 6 miles. Seven out of 10 employees live within 10 miles to Cabrillo. About 1 in every 10 employees drops off family members or runs errands any day of the week. For most of them, this would add on 15 minutes of commute time. Except for the weekend, most of the employees arrive earlier than 8 or between 8 and 10 a.m. Most of the employees leave between 3 and 5 or after 5 p.m. About 6% of them leave the campus during lunch hour (12 – 1 p.m.). Over half of the employees who leave the campus during the day in any day of the week reported personal reasons (54.6%). Another 30.6% reported employment related reason. Only 9.3% reported education related reasons.

Close to 75% employees drive alone to work (Figure 1). Just as was found in Cabrillo's 1999 Campus Climate survey for students, the number of times per week that an employee drives solo to work is not significantly related to the distance traveled ( $R^2 < 0.0005$ ,  $p = 0.82$ ). Carpooling is the next most common mode. Almost everyone has a parking permit (95.5%); conversely, only 8.1% have bus passes. One in three (32.2%) of the Cabrillo employees believed part of their work can be completed via telecommuting. Only 10.2% of the employees were aware of the emergency taxi services offered by TMA.

Carpooling did not seem to appeal to staff and faculty who did not do so already. There did appear to be interest in increased express bus service. Further, staff and faculty indicated that automatically receiving a bus pass would make them more likely to ride the bus (Table 7, Figure 2). Increasing bike lanes and general bicycle safety were noted as motivators for bicycle commuting (Table 2, Figure 3). There was strong interest in walking provided the respondent lived close to Cabrillo. There did not seem to be a strong interest in motorcycle riding. Reducing environmental impacts and traffic congestion were the primary reasons for considering alternative transportation options. Inconvenience and increased travel time were the primary reasons for not considering alternative transit. Almost 7% of staff and faculty indicated that expanded on campus childcare would reduce their driving. 85% of respondents indicated they were generally satisfied with their commute to Cabrillo.

## **Students**

About a fifth (21.8%) of main campus students live within 3 miles of the campus as compared to 39.1% of Watsonville Center students. Almost 60% of SLV students lived over 10 miles away from SLV. About 34% of main campus students drop off family members during their commute compared to 43% of Watsonville students and 27% of SLV students. For most of them, this would add on no more than 15 minutes of commute time for main campus and Watsonville students and no more than 30 minutes for SLV students.

Except for the weekend, most of the main campus students arrive earlier than 8 or between 8 and 10 a.m. and about one-third leave between 1 and 3. Watsonville students tend to show a concentration of arrivals and departures before 1 p.m. and after 5 p.m. SLV student arrivals and departures are generally after 5 p.m. Under half (41%) of the main campus students who leave the campus during the day in any day of the week reported educational reasons compared to 78.5% of Watsonville students and 63% of SLV students. For main campus students 35% left for personal reasons and only 11% left for employment reasons.

The majority of all respondents indicated they drive alone at least once with carpools and buses being next most common modes (Figure 1). Just as with Cabrillo's 1999 Campus Climate Survey and with staff and faculty in this survey, there were not strong associations between distance traveled and number of solo commutes per week. There was a statistically significant but extremely weak linear relation between distance traveled to class and number of solo commutes per week for Main campus students ( $R^2 < 0.007$ ,  $p = 0.005$ ) and for Watsonville students ( $R^2 = 0.007$ ,  $p = 0.005$ ), and an insignificant relation for SLV students ( $R^2 = 0.005$ ,  $p = 0.564$ ). As statistical significance is a function of sample size, the effect size guides the interpretation that distance traveled does not relate to number of solo commutes. About three-quarters of main campus and Watsonville students have parking permits and about one in seven have bus passes. The majority of SLV students had neither.

Free parking passes for carpoolers appeared to appeal to all students. Bus riding received more consideration with convenience enhancements such as express service, automatically received bus passes, transfers, and close bus stops (Table 1, Figure 2). More bike lanes and bike lockers were often noted as incentives to cycling (Table 2, Figure 3). Saving money and the environment were noted as prime motivators for alternative transportation while inconvenience and time considerations were cited as main inhibitors for alternative transportation. About 10% of Main Campus students and 32% of Watsonville students indicated that expanded on campus childcare would reduce their driving. Most claimed to be relatively unaware of transportation options

especially for Watsonville and SLV students. 85% of respondents indicated they were generally satisfied with their commute to Cabrillo. 65% of Main Campus students, 49% of Watsonville students, and 58% of SLV students stated they were generally satisfied with their commute.

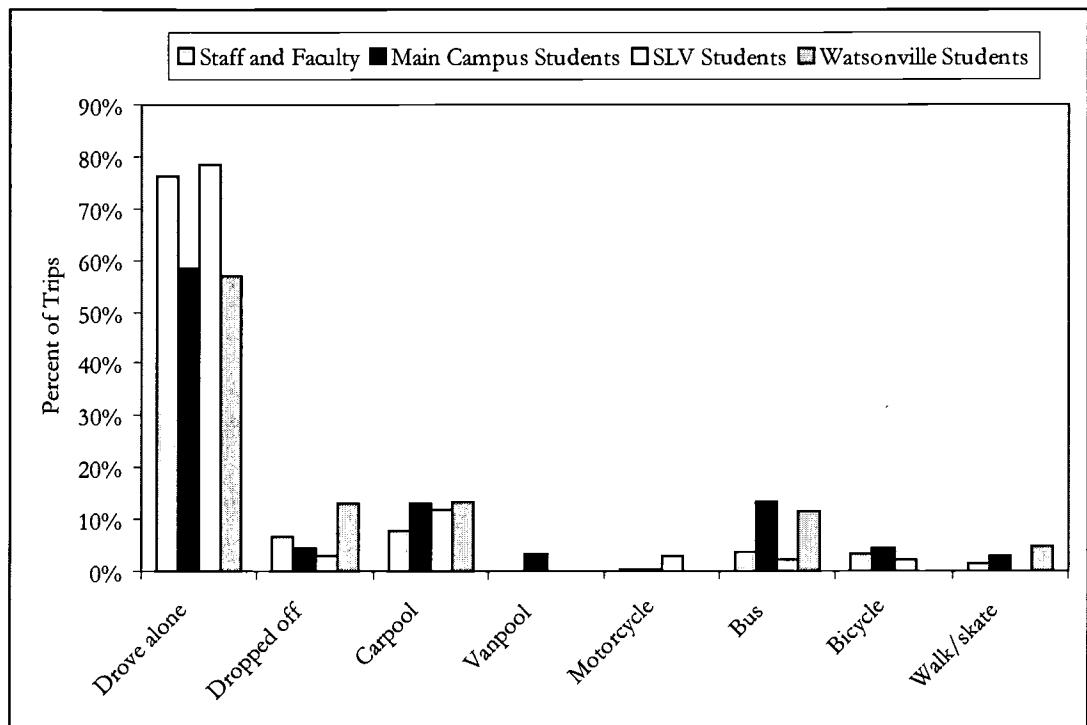
## **Discussion and Recommendations**

Bus riding may be the most popular alternative transit option that can be affected by transportation management. The two strongest motivators to considering using the bus were more express buses and automatically receiving a bus pass. Both of these address reducing the inconvenience cited as a demotivator for alternative transit. While express buses are not practical for every route, there is the implied desire for bus trips to be quicker in general. Part of this may be accomplished through revising or adding routes that are more direct or reduce the need to change buses to reach a destination. In addition, promotional campaigns that noted the benefits of bus riding to the environment, reducing congestion, and saving money would align with respondents' primary reasons for considering alternative transportation.

Carpooling in general did not appear to be an option subject to great influence by the motivators offered in the survey. On the other hand, bicycle riders indicated they would be motivated by an increase in the number of bike lanes. Portions of routes to Cabrillo that are currently lacking bike lanes, such as the Soquel Village, should be examined for the feasibility of adding bicycle lanes.

Other modes of transportation such as walking, skating, motorcycles, being dropped off, and vanpools were either used too infrequently or appeared too indisposed to proposed incentives warrant specific recommendations. However, they should continue to receive attention in future research and planning efforts.

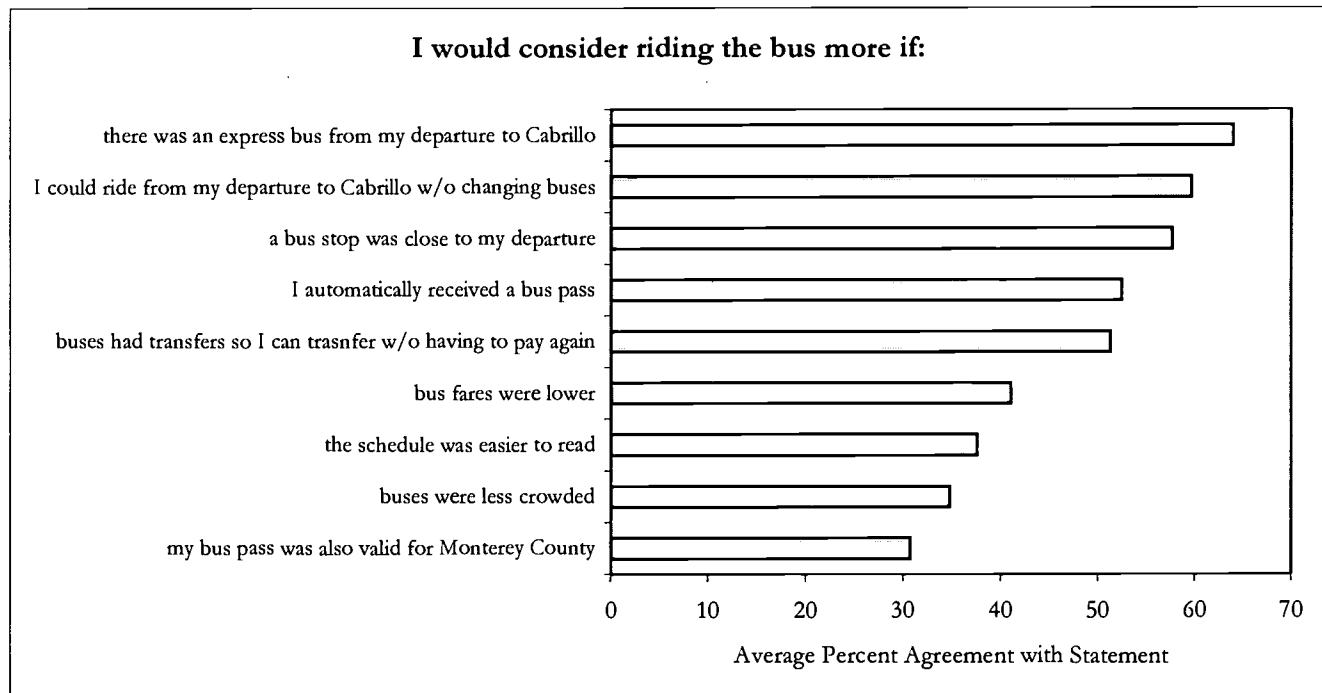
Finally, for no group did the distance traveled relate to the number of solo commutes made per week. This suggests that distance may not be a factor with great influence in the commuting decisions of Cabrillo workers and students.



**Figure 1. Mode of transit to Cabrillo and satellites by survey respondents.**

**Table 7. Survey Respondents Percent Agreements to Statements on Bus Riding**

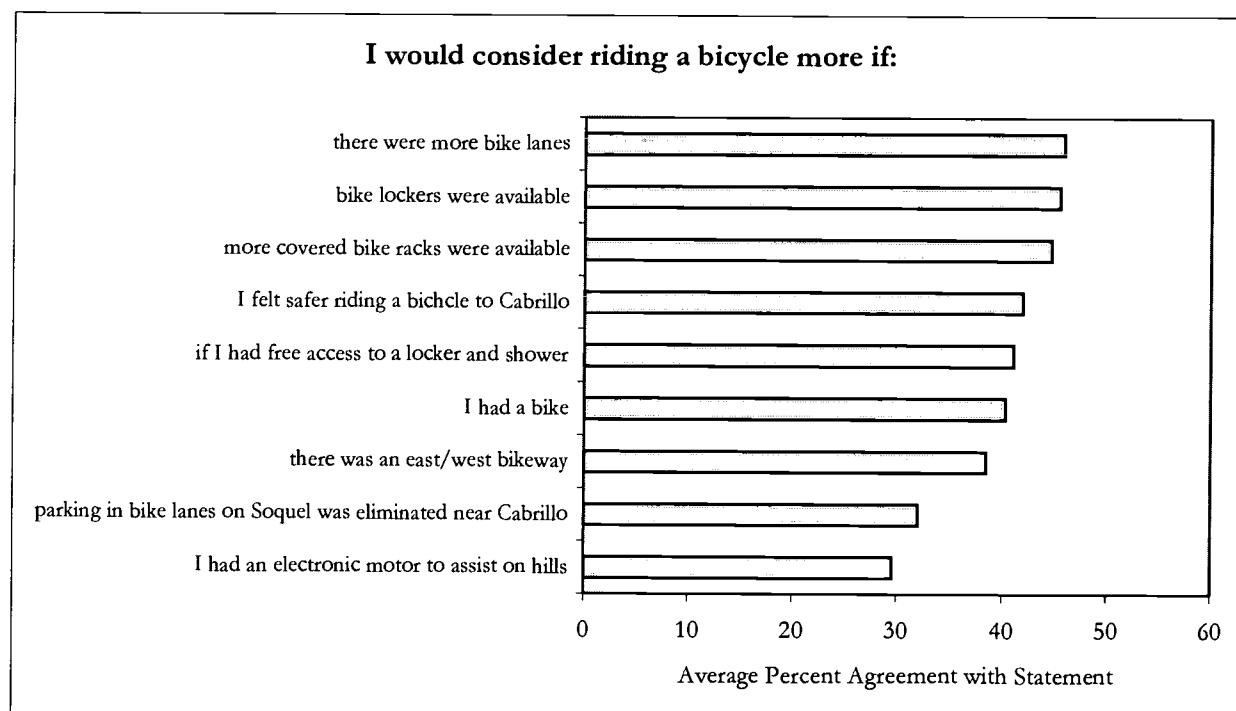
I would consider riding the bus more if:	Staff and Faculty	Main Campus Students	SLV Students	Watsonville Students
a bus stop was close to my departure	46.6	53.4	48.8	82.1
I could ride from my departure to Cabrillo w/o changing buses	57.5	60.5	52.2	68.6
buses had transfers so I can transfer w/o having to pay again	45.9	46.8	41.5	71.0
bus fares were lower	24.8	45.8	32.5	61.2
there was an express bus from my departure to Cabrillo	58.1	63.0	59.6	75.4
buses were less crowded	26.4	38.3	17.5	56.9
I automatically received a bus pass	47.0	54.7	40.0	68.1
the schedule was easier to read	27.7	36.8	20.0	65.6
my bus pass was also valid for Monterey County	20.0	30.3	17.1	55.6



**Figure 2. Survey Respondents Average Agreement to Bus Riding Statements.**

**Table 8. Survey Respondents Percent Agreements to Statements on Bicycle Riding**

I would consider riding a bicycle more if:	Staff and Faculty	Main Campus Students	SLV Students	Watsonville Students
there were more bike lanes	40.0	51.0	48.7	43.6
there was an east/west bikeway	36.0	48.4	29.7	39.6
parking in bike lanes on Soquel was eliminated near Cabrillo	32.0	30.6	27.0	38.3
more covered bike racks were available	35.0	50.7	42.1	50.9
bike lockers were available	37.0	51.3	40.5	52.9
if I had free access to a locker and shower	35.0	46.4	39.5	43.4
I felt safer riding a bicycle to Cabrillo	40.0	47.3	32.4	48.1
I had an electronic motor to assist on hills	30.0	37.7	27.0	23.4
I had a bike	21.0	47.5	40.6	52.1



**Figure 3. Survey Respondents Average Agreement to Bicycle Riding Statements.**